

## FUSE

The present application is based on Japanese Patent Application No. 2002-204108, which is incorporated herein by reference.

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### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

The present invention relates to a fuse, and more particularly, to a blade type fuse which includes a fuse element having a fusible portion provided between a pair of flat plate terminal portions arranged in parallel, the fuse element being  
10 incorporated in an insulating housing.

#### 2. Related Art

A conventional fuse 1 as illustrated in Fig. 5 is a blade type fuse of low height which includes a fuse element 3 having  
15 a fusible portion 5 provided between a pair of flat plate terminal portions 4, 4 arranged in parallel, and an insulating housing 2 made of synthetic resin which contains the fuse element 3.

The aforesaid flat plate terminal portions 4 are respectively formed in a substantially rectangular shape, and  
20 the aforesaid fusible portion 5 is provided between these flat plate terminal portions 4, 4 so as to laterally bridge their opposed inner edges 4a, 4a.

The aforesaid insulating housing 2 which includes a pair of housing bodies 2a, 2a and an upper wall portion 2c mutually  
25 connecting upper ends of the housing bodies 2a, 2a is adapted

to cover the inner edges 4a and upper edges 4c of the aforesaid flat plate terminal portions 4 and the aforesaid fusible portion 5.

As shown in Fig. 6, on one side edge of a slit opening 5 6 formed at a lower end of the aforesaid insulating housing 2, a flap 2b which is integrally formed with the housing through a thin-walled hinge 8 is continuously provided so as to freely rotate.

This flap 2b is rotated to a closed position in a state 10 where the fuse element 3 has been inserted into the insulating housing 2 from the aforesaid slit opening 6, and locked to locking projections 4b which are projected from the aforesaid inner edges 4a of the respective flat plate terminal portions 4 thereby to be held in the closed position.

15 In this manner, according to the fuse 1, the flat plate terminal portions 4, 4 are held in the insulating housing 2, and so, concentration of outer forces to the fusible portion 5 will be prevented.

However, in the above described conventional fuse 1, the 20 flap 2b of the insulating housing 2 is connected to one of the housing bodies 2a only through the thin-walled hinge 8 at its base end side, while its distal end side is just abutted against a lower end edge 7 of the other housing body 2a.

Therefore, there has been such probability that in case 25 where an outer force has been applied to the aforesaid flap

2b in a direction to open it, the flap 2b rides over the aforesaid locking projections 4b and becomes unable to protect the fusible portion 5.

There has been another problem that the aforesaid insulating housing 2 has an open structure in section in which the upper ends of a pair of the housing bodies 2a, 2a are mutually connected through the upper wall portion 2c, and so, it has been difficult to enhance strength of the insulating housing and to improve protecting performance for the fusible portion

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#### SUMMARY OF THE INVENTION

In view of the above, an object of the present invention is to solve the above described problems, and to provide a favorable fuse in which deformation of a flap due to outer forces will be prevented and strength of an insulating housing can be enhanced.

The above described object of the invention is attained by a fuse comprising a fuse element which includes a fusible portion provided between inner edges of a pair of flat plate terminal portions arranged in parallel, and an insulating housing which includes a pair of housing bodies and an upper wall portion mutually connecting upper ends of the housing bodies, and covers the inner edges and upper edges of the aforesaid flat plate terminal portions and the aforesaid fusible portion, characterized in that on one side edge of a slit opening formed

at a lower end of the aforesaid insulating housing, a flap which is integrally formed with the housing through a thin-walled hinge is continuously provided so as to freely rotate, and a distal end edge of the aforesaid flap is joined to the other side edge of the aforesaid slit opening, in a state where the aforesaid fuse element has been inserted into the insulating housing.

According to the above described structure, because the flap which is integrally formed at the lower end of one of the housing bodies through the thin-walled hinge is joined to the lower end edge of the other housing body at its distal end edge, the flap can be reliably held in a closed state.

Therefore, in case where an outer force has been applied to the aforesaid flap, the flap will not be displaced nor deformed so as to be easily opened, and the fusible portion can be reliably protected.

Moreover, because the slit opening formed at the lower end of the aforesaid insulating housing is reliably closed with the aforesaid flap which is joined at its distal end edge, the insulating housing will have a closed structure in section, and thus, strength of the insulating housing will be enhanced.

Further, the distal end edge of the aforesaid flap is preferably joined to the other side edge of the aforesaid slit opening by welding or by means of at least one locking pawl.

In this case, joining work for joining the distal end

edge of the aforesaid flap to the other side edge of the aforesaid slit opening becomes easy, and productivity can be improved.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view showing an exterior appearance of a fuse according to a first embodiment of the present invention;

Fig. 2 is a perspective view in section of the fuse as shown in Fig. 1.

Fig. 3 is a perspective view showing an exterior appearance of an essential part of a fuse according to a second embodiment of the invention.

Fig. 4 is a perspective view showing an exterior appearance of an essential part of a fuse according to a third embodiment of the invention.

Fig. 5 is a sectional view of a conventional fuse.

Fig. 6 is an enlarged sectional view of an essential part of the fuse as shown in Fig. 5.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Now, an embodiment of the invention will be described in detail, referring to the attached drawings.

Fig. 1 is a perspective view showing an exterior appearance of a fuse according to a first embodiment of the invention, and Fig. 2 is a perspective view in section of the fuse as shown in Fig. 1. It is to be noted that since a fuse element in a fuse 10 of this first embodiment has substantially the same

structure as the fuse element 3 as shown in Fig. 5, the same components are denoted with the same reference numerals, and their detailed description will be omitted.

5 The fuse 10 in this first embodiment is a blade type fuse of low height which includes, as shown in Figs. 1 and 2, a fuse element 3 having a fusible portion 5 provided between a pair of flat plate terminal portions 4, 4 arranged in parallel, and an insulating housing 11 made of synthetic resin in a T-shape which contains the fuse element 3.

10 The aforesaid insulating housing 11 which includes a pair of housing bodies 11a, 11a and an upper wall portion 11c mutually connecting upper ends of the housing bodies 11a, 11a is adapted to cover inner edges 4a and upper edges 4c of the aforesaid flat plate terminal portions 4, and the aforesaid fusible portion  
15 5.

Moreover, on one side edge of a slit opening 16 formed at a lower end of the aforesaid insulating housing 11, a flap 11b which is integrally formed with the housing through a thin-walled hinge 18 is continuously provided so as to freely  
20 rotate, as shown in Fig. 2.

This flap 11b is rotated to a closed position in a state where the fuse element 3 has been inserted into the insulating housing 11 from the aforesaid slit opening 16, and locked to locking projections 4b which are projected from the aforesaid  
25 inner edges 4a of the respective flat plate terminal portions

4.

Further, the distal end edge of the aforesaid flap 11b which is abutted against the other side edge 12 of the aforesaid slit opening 16 (the lower end edge of the other housing body 11a) is joined by ultrasonic welding, thermal welding or the like, as shown in Fig. 2.

Specifically, according to the fuse 10 in this first embodiment, the flap 11b which is integrally formed with one of the housing bodies 11a (a frontward one in the drawings) through the thin-walled hinge 18 is joined to the lower end of the other housing body 11a (a backward one in the drawings) at its distal end edge, and therefore, it is possible to reliably hold the flap 11b in the closed state.

Therefore, in case where an outer force has been applied to the aforesaid flap 11b in a direction to open it, the flap 11b will not be displaced nor deformed so as to be easily opened, and the aforesaid fusible portion 5 can be reliably protected.

Moreover, because the slit opening 16 formed at the lower end of the aforesaid insulating housing 11 is reliably closed with the aforesaid flap 11b which is joined at its distal end edge, the insulating housing 11 will have a closed structure in section, and thus, strength of the insulating housing will be enhanced.

Consequently, by employing the aforesaid insulating housing 11 which has the enhanced strength, according to the

fuse 10 in this first embodiment, protecting performance for the aforesaid fusible portion 5 can be enhanced.

Further, the structure including the fuse element, housing bodies, flap, and so on in the fuse according to the invention is not restricted to the structure in the above  
5 described embodiment, but it is needless to say that various forms can be employed on the basis of concept of the invention.

Fig. 3 is a perspective view showing an exterior appearance of an essential part of a fuse according to a second embodiment  
10 of the invention.

A fuse 20 in this second embodiment is a blade type fuse of low height which includes a fuse element 3 having a fusible portion 5 provided between a pair of flat plate terminal portions 4, 4 arranged in parallel, and an insulating housing 21 made  
15 of synthetic resin which contains the fuse element 3, similarly to the fuse 10 in the first embodiment as shown in Fig. 1.

As shown in Fig. 3, on one side edge of a slit opening formed at a lower end of the aforesaid insulating housing 21, a flap 21b which is integrally formed with the housing through  
20 a thin-walled hinge 28 is continuously provided so as to freely rotate, and a locking pawl 23 is projected from a distal end edge 22 of the flap 21b.

The aforesaid flap 21b is rotated to a closed position in a state where the fuse element 3 has been inserted into the  
25 insulating housing 21 from the slit opening, and locked to the



locking projections 4b which are projected from the aforesaid inner edges 4a of the respective flat plate terminal portions 4.

Moreover, the distal end edge 22 of the aforesaid flap 21b is joined in such a manner that the aforesaid locking pawl 23 is locked to the other side edge 24 of the above described slit opening (the lower end edge of the other housing body 21a).

Therefore, also with the fuse 20 in this second embodiment, the protecting performance for the fusible portion 5 of the fuse element 3 which has been inserted into the insulating housing 21 can be enhanced, in the same manner as with the fuse 10 in the above described first embodiment.

Fig. 4 is a perspective view showing an exterior appearance of an essential part of a fuse according to a third embodiment of the invention. An insulating housing 31 of a fuse 30 according to this third embodiment is continuously provided, on one side edge of a slit opening formed at its lower end as shown in Fig. 4, with a flap 31b which is integrally formed with the housing through a thin-walled hinge 38 so as to freely rotate, and a pair of locking pawls 33, 33 are projected from a distal end edge 32 of the flap 31b.

The aforesaid flap 31b is rotated to a closed position in a state where the fuse element 3 has been inserted into the insulating housing 31 from the slit opening, and locked to the locking projections 4b which are projected from the aforesaid

inner edges 4a of the respective flat plate terminal portions  
4.

Moreover, the distal end edge 32 of the aforesaid flap  
31b is joined in such a manner that a pair of the aforesaid  
5 locking pawls 33, 33 are locked to the other side edge 34 of  
the slit opening (the lower end edge of the other housing body  
31a).

Therefore, also with the fuse 30 in this third embodiment,  
the protecting performance for the fusible portion 5 of the  
10 fuse element 3 which has been inserted into the insulating  
housing 31 can be enhanced, in the same manner as with the fuse  
20 in the above described second embodiment.

Further, because the aforesaid locking pawls 33 are  
provided in a pair, it is possible to obtain a larger joining  
15 force than a locking force by means of the locking pawl 23 in  
the above described second embodiment.

It is to be noted that the flaps 21b, 31b according to  
the above described second and third embodiments can be joined  
only by locking the aforesaid locking pawls 23, 33 to the  
20 aforesaid side edges 24, 34 thereby to eliminate necessity of  
subsequent steps such as welding works, and assembling  
workability will be enhanced.

As described herein above, according to the fuse of the  
present invention, the flap which is integrally formed at the  
25 lower end of one of the housing bodies through the thin-walled

hinge is joined to the lower end edge of the other housing body at its distal end edge, and accordingly, the flap can be reliably held in the closed state.

Therefore, in case where an outer force has been applied to the aforesaid flap, the flap will not be displaced nor deformed so as to be easily opened, and the fusible portion can be reliably protected.

Moreover, because the slit opening formed at the lower end of the aforesaid insulating housing is reliably closed with the aforesaid flap which is joined at its distal end edge, the insulating housing will have a closed structure in section, and thus, strength of the insulating housing will be enhanced.

Consequently, by employing the aforesaid insulating housing which has the enhanced strength, according to the fuse of the invention, the protecting performance for the aforesaid fusible portion can be enhanced.